SOCIAL STORIES AS A TOOL TO HELP PRESCHOOL AGED CHILDREN WITH AUTISM SPECTRUM DISORDERS UTILIZE SELF-REGULATION STRATEGIES TO PROMOTE INCREASED FUNCTIONAL BEHAVIORS

by

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ABSTRACT

A multiple baseline across participants design was used to evaluate the effects of Social Stories as a tool to help preschool aged children with Autism Spectrum Disorders (ASD) utilize self-regulation strategies to promote increased functional behaviors. Three children from a self-contained preschool classroom designed to educate children with ASD were selected to participate in the study. The intervention included reading individualized Social Stories that discussed target behaviors and self-regulation strategies, along with practicing the self-regulation strategies with the interventionist. I measured the percentage of intervals in which the participants engaged in self-regulatory behaviors and/or demonstrated desired behaviors as defined by the researcher and classroom teacher. Following intervention, the frequency of desired behaviors increased for all 3 participants while the use of self-regulatory behaviors varied across participants. These findings suggest that the intervention was successful in teaching self-regulation strategies and increasing functional behaviors in preschool aged children with ASD.

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CHAPTER 1

INTRODUCTION

Kogen et al. (2009) reported that the prevalence of Autism Spectrum Disorders (ASD) in 2007 was 1 in 91 children (ages 3-17), or 1% of the U.S. population. Behavioral characteristics critical to the diagnosis of Autistic Disorder can be categorized into four subclusters of disturbances (APA, 2000; Rogers, 2005). These include disturbances in social interaction, communication, behaviors, and sensory and perceptual processing and associated impairments. These atypical combinations of social, sensory, communication, and behavioral characteristics can have considerable negative effects on a child's ability to participate in home, school and community activities (Rogers, 2005).

Disturbances in social interaction affect a child's ability to establish meaningful relationships. Common behaviors engaged in by children with ASD, who have difficulty with social interaction, include poor or deviant eye contact, aversion to physical contact, failure to develop peer relationships, lack of social reciprocity, lack of spontaneous seeking of another to share enjoyment, and apparent preference for being alone (Rogers, 2005). Many children with ASD who have difficulties with social interaction interact in rigid, mechanical and idiosyncratic ways. These behaviors affect a child's ability to

communicate with peers and to engage in the complex play of preschool children who are developing typically (Greenspan, 1992; Greenspan & Wieder, 1997).

Disturbances in communication can range from mild to severe, including normal language accompanied only by slight articulation or tonal deficits to complete lack of speech (Rogers, 2005). Additional characteristics of communication difficulties include echolalia, syntax problems, atonal and arrhythmic speech, pronoun reversals, and lack of inflection and emotion during communication (Huebner, 1992; Rogers, 2005).

Disturbances in behaviors include resistance to change, attachments to unusual objects and obsessive rituals. These behaviors are often considered stereotyped, perseverative, and lacking in representational or pretend play (Rogers, 2005). Other disturbances in behaviors include hyperactivity, short attention span, impulsivity, aggressiveness, and self-injurious behavior (APA, 1994). Deviant motor patterns that involve the arms, hands, lower extremities, or the entire body, such as hand flapping or flicking the fingers are also considered disturbances in behaviors (Rogers, 2005).

Sensory processing disorders contribute to the disturbances of sensory and perceptual processing seen in children with ASDs (Rogers, 2005). Dr. A. Jean Ayres, an occupational therapist, educational psychologist, and neuroscientist who pioneered the study of sensory processing disorders describes two types of sensory processing problems in children with autistic behaviors (Miller, 2006; Rogers 2005).

The first type of sensory processing disorder is described as dysfunction in the registration of or orientation to sensory input entering the nervous system. How a child responds to visual and auditory stimuli, touch and the movement of their body are a part of the neurophysiologic process that decides what sensory stimuli will be brought to a

child's attention (Parham & Mailloux, 2005). For children with autism, this system may work correctly at some times but not at other times. For example, a child may react normally to sensory stimuli one minute and the next minute he or she may over or under react to the same stimuli (Parham & Mailloux, 2005).

The second type of sensory processing problem found in children with ASD involves dysfunction in the modulation of sensory stimuli once it has entered the neurological system. This difficulty interferes with sensory modulation which is an individual's ability to respond adaptively to sensation over a broad range of intensity and duration (Lane, 2002). In a self-regulated state of sensory modulation, the nervous system provides an adjusted response rather than over or under reacting to sensory stimuli. A child who is over responsive is overwhelmed by ordinary sensory input such as touch or movement. In this situation, a child may react defensively to the sensation, often with a strong negative emotion and activation of the sympathetic nervous system. A child who is under responsive may fail to notice sensory stimuli that elicit the attention of most people. Children who are under responsive may be slow to respond to sights, sounds, touch and movement, and may crave intense sensory input (Parham & Mailloux, 2005).

As children with ASD demonstrate unique disturbances and characteristics, they present significant challenges to educators and caregivers (Cohn, Miller, & Tickle-Degnen, 2000; Simpson, de Boer-Ott, & Smith-Myles, 2003). Thus, it is important that caregivers and educators have effective, evidence-based treatment strategies to meet the individualized needs of children with ASD.

CHAPTER 2

LITERATURE REVIEW

Interventions Designed to Meet the Needs of Children with Autism

Key goals of treatment for children with ASD include decreasing central features and related deficits, maximizing functional independence and quality of life, and easing family distress. To help educators and caregivers accomplish these goals, treatment should focus on facilitating development and learning, promoting socialization, and reducing maladaptive behaviors (Myers & Johnson, 2007).

Two cornerstones in the management of ASD include behavioral and habilitative intervention strategies (Myers & Johnson, 2007). Within these interventions, specific functional skills related to communication, social interaction, daily-living, play and leisure, academics, and maladaptive behaviors can be targeted. Two intervention strategies that are gaining evidence to support their efficacy in helping children with ASD achieve functional goals include sensory integrative- based treatment and Social Stories (e.g., Gray, 2004; Miller, Anzalone, Lane, Cermak, & Osten, 2007).

Sensory Integrative-based Treatment

Sensory integrative-based treatment approaches are designed to help individuals modulate or self-regulate their sensory systems. Sensory modulation provides the foundation for a person to perform adaptively in day-to-day activities and supports a child's ability to maintain an optimal level of arousal, attention, and activity to meet the demands and expectations of the environment and task (Miller, Anzalone, Lane, Cermak, & Osten, 2007).

Sensory processing disorders, including difficulties with sensory modulation, involve central rather than peripheral sensory functions (Rogers, 2005). Central sensory systems include the vestibular, proprioceptive, and tactile systems. The vestibular sense processes information about movement, gravity, and balance, and receives sensory input through the inner ear. The proprioceptive sense processes information about body position and body parts, which it receives through muscles, ligaments, and joints. The tactile sense processes information about touch and is primarily received through the skin (Kranowitz, 1998). Sensory processing problems exist when sensory signals do not get organized into correct responses resulting in interruptions to a child's daily routines and activities (Miller, 2006).

Interventions to address sensory modulation disorders incorporate activities designed to decrease or increase arousal levels (Ayres, 1979; Schaff et al., 2010). These activities are typically identified by an occupational therapist, and can be taught to educators and caregivers to use throughout a child's day. During intervention, a child is introduced to various sensory opportunities, with the intent of providing at least two of the following three types of sensations: tactile, vestibular, and proprioceptive (Schaff et

al., 2010). Examples include introducing texture to an over responsive child, starting with the less bothersome textures and gradually working up to more bothersome textures. As another example, children who demonstrate high arousal levels can be introduced to heavy work activities, such as movement against weight or resistance. These activities can be embedded into daily routines and play activities and can include deep touch pressure, hugging, massage, squeezing objects, or moving through an obstacle course. For children with low arousal, interventionists can introduce opportunities for fast, irregular and rotational movements. These activities can be embedded into daily routines and play activities that include bouncing on a large ball, jumping on a trampoline, or spinning on a swing in the classroom or playground. In summary, sensory integrative-based interventions are designed to address underlying deficits in sensory modulation with the assumption that, as a child achieves adaptive responses, self-regulation and social participation will increase (Schaff et al., 2010).

The sensory integrative approach to help children with sensory modulation difficulties self-regulate and increase functional skills is supported in the literature (e.g., Case-Smith & Bryan, 1999; Linderman & Stewart, 1999; Schaff & Nightlinger, 2007). Using a single subject AB research design, Case-Smith and Bryan (1999) examined the effects of sensory integration intervention with five preschool aged children with autism. Following a 3-week baseline period, an occupational therapist provided one-on-one sensory integrative based treatment and consultation to teachers for 10 weeks. Four children demonstrated decreased frequency of nonengaged behavior, and three demonstrated increased frequency of goal-directed play. Improvements in frequency of interaction were minimal (Case-Smith & Bryan, 1999).

Schaaf and Nightlinger (2007) presented a case study report of a 4-year-old child with poor sensory processing abilities. The authors described the child's behaviors and changes in his overall functioning during 10 months of occupational therapy treatment using a sensory integrative approach. Specific goals were developed based on assessment data, and progress towards goals was measured using goal attainment scaling (Kiresuk, Smith, & Cardillo, 1994). Results revealed that the child attained his target level in each goal, and improvements in his ability to tolerate and process sensory input were apparent in home, community, and clinic environments (Schaff & Nightlinger, 2007).

Linderman and Stewart (1998) explored the impact of outpatient clinic based sensory integrative intervention on the functional behaviors of two, 3-year-old boys with pervasive developmental disorder (PDD) at home. Three target behaviors were identified for each child using an adapted version of Cook's revised Functional Behavior Assessment for Children with Sensory Integrative Dysfunction (Cook, 1991). Using an AB design, participant 1 received 11 weeks of treatment, and participant 2 received 7 weeks of treatment. Both participants displayed significant improvements in the areas of social interaction, approach to new activities, response to holding or hugging, and response to movement. Decreases were noted in frequency of disruptive behaviors, with an increase in functional behaviors, such as spontaneous speech, purposeful play, and attention to activities and conversation (Linderman & Stewart, 1998).

In addition to sensory integrative-based treatment approaches, Social Stories also help children with ASD gain functional skills. Social Stories focus on a person's perspective of a situation and provide information that can help them understand and

improve previously misunderstood situations (Gray & Garand, 1993). Social Stories support intervention strategies identified as important by Myers and Johnson (2007) through facilitating social learning and assisting in the reduction of maladaptive behaviors.

Social Stories

Social Stories are individualized stories written specifically to describe a situation, skill, person, concept, or social situation (Gray, 2004). Introduced by Carol Gray in 1991, Social Stories are used to share, with a student, relevant information including where and when a situation takes place, who is involved, what is occurring and why (Gray, 2004). The rationale behind Social Stories is based on the growing understanding of social cognition in autism. Specifically, many individuals with autism have impairments that impede their ability to read and understand social situations and then formulate appropriate responses. Social Stories provide an individual with autism an accurate understanding of a situation as well as an understanding of which behavior(s) are appropriate in that situation (Gray & Garand, 1993).

In 2004, new criteria and rules for writing Social Stories (including clarifications related to common misconceptions and guidelines to ensure correct format) were developed (Gray, 2004). Figure 1 provides a task analysis for writing a Social Story and includes Gray's 10 guidelines, the six sentence types that either describe or direct an action or event, and the Social Story formula which serves as a check for the writer to certify that at least 50% of the story's sentences affirm actions that a child does well (Gray, 2004).

Several studies have examined the use of Social Stories to improve social skills and decrease unwanted behaviors in children with ASD (Agosta, Graetz, Mastropieri, & Scruggs, 2004; Barry & Berlew, 2004; Hagiwara & Myles, 1999; Ivey, Heflin & Alberto, 2004; Swaggart, Gagnon, Bock, & Earles, 1995). Included among these are three studies that examined the effects of Social Stories on increasing appropriate behaviors in preschool and school aged children (Crozier & Tincani, 2007; Kuoch & Mirenda, 2003; Scattone, Wilczynski, Edwards, & Rabian, 2002).

Kuoch and Mirenda (2003) conducted a study designed to address some of the methodological problems found in the existing Social Story literature, including failure to conform to the sentence ratios suggested by Gray (1995, 2000). Targeting a decrease in inappropriate behaviors, such as aggression towards family and peers, removing chewed food from mouth, and cheating during game play with peers; the investigators used an ABA design for two of the participants, and an ACABA design for the third participant. The ages of the children involved in the study were between 3 and 6 years. The intervention for one participant occurred in the home while the interventions for the other two participants were delivered during school programs. Each participant took part in a preintervention assessment. Following assessment, target behaviors were identified and Social Stories were written. Target behaviors included sharing, eating lunch and snacks appropriately, and playing games according to the rules. Interventionists were trained by the experimenter to record instances of a participant's target behaviors. The stories were read directly to each participant prior to the situations in which the target behaviors typically occurred. Results indicated that all three participants immediately reduced their

rate of problem behaviors when the Social Story was implemented (Kuoch & Mirenda, 2003).

Crozier and Tincani (2007) conducted a similar study investigating the effect of Social Stories on the prosocial behavior of three children with ASD in an inclusive preschool setting. The researchers used an ABAB design for two participants and an ABACBC design for the third. In cooperation with the children's teachers, the investigators identified target behaviors for each participant. Target behaviors included sitting appropriately during the first 10 minutes of circle time, talking with peers during snack time, and replacing inappropriate play with appropriate play with peers in the block center. A Social Story was written for each child, and the story was read to the child before an opportunity to engage in target behaviors. The investigators observed each child during the activity that followed the Social Story and recorded whether or not the target behavior occurred. Results revealed a reduction of inappropriate behaviors and an increase in appropriate behaviors across all participants (Crozier & Tincani, 2007).

Although their participants were older than the participants in the investigations by Crozier and Tincani (2007) and Kouch and Mirenda (2003), Scattone, Wilczynski, Edwards, and Rabin (2002) also examined the effectiveness of Social Story interventions on decreasing the disruptive behaviors of three children with autism ranging in age from 7-15 years. Specific target behaviors included tipping backwards and sideways on a classroom chair, staring inappropriately at females during recess, and shouting out during math class. Social Stories were developed to target each participant's disruptive behavior, and a multiple baseline design was used to evaluate effectiveness. The students either read or were read the Social Stories at school each morning. Researchers recorded

the occurrence of disruptive behavior during 20-minute observation sessions for each participant three times per week. Results indicated that all three participants demonstrated a reduction in their disruptive behaviors after the Social Story intervention was introduced (Scattone, Wilczynski, Edwards, & Rabin, 2002).

Research related to Social Stories provides educators with evidence supporting the effectiveness of Social Stories in either increasing desired social behaviors or decreasing unwanted behaviors in individuals with ASD (Agosta, Graetz, Mastropieri, & Scruggs, 2004; Barry & Berlew, 2004; Crozier & Tincani, 2007; Hagiwara & Myles, 1999; Ivey, Heflin & Alberto, 2004; Kuoch & Mirenda, 2003; Scattone, Wilczynski, Edwards, & Rabin, 2002; Swaggart, Gagnon, Bock, & Earles, 1995). Research supports the idea that Social Stories help teach individuals how to (a) compensate for lack of social awareness, and (b) engage in socially appropriate behaviors (Gray & Garand, 2003). However, limited research exists that investigates the use of Social Stories to help individuals with ASD understand the possible underlying physical causes of their behaviors, and what strategies they can implement to address their specific problems. For example, a child with ASD may have difficulty tolerating clothing seams against his skin, and as a result takes off his clothing at school. This behavior would typically be identified in a Social Story as one that should not occur at school, with the importance of keeping clothes on at school emphasized. However, the story may not describe to the student why he has difficulty tolerating the seams in his clothes, or how he can remediate the problem in a socially appropriate way. Investigating the use of Social Stories to help individuals understand the possible underlying physical causes of their behavioral difficulties could support educators in meeting the needs of individuals with ASD.

Sensory Stories

While research investigating the effectiveness of sensory integrative-based interventions and Social Stories continues to increase, little research exists to study the combined use of these approaches when working with young children with ASD. One program, called Sensory Stories, is a story based intervention that is designed to improve a child's participation in activities that are perceived as noxious by providing the child with suggested sensory strategies to self-implement during the activity (Marr, Mika, Miraglia, Roerig, & Sinnot, 2007). Sensory Stories are commercially available and include 30 prewritten stories in CD-ROM format. The stories can be customized to meet a child's needs by changing the wording or suggested story format.

A study using Sensory Stories examined their effectiveness on "circle time" behaviors (i.e., remaining seated and decreasing hand flapping or excessive head shaking) in four preschool children with ASD. The intervention involved having the teacher or classroom aide read the Sensory Story to each of the participants one to three times per day. Teachers were encouraged to provide verbal and physical cues on implementing the sensory strategies to the children during the reading of the Sensory Story and during circle times. Using time sampling, the researchers observed the participants for 10 seconds and then recorded observations for 10 seconds during a 20-minute observation period. The authors noted positive changes in behaviors in three of the children. The fourth child also showed positive change in behaviors. However, for the fourth child, behaviors were already improving during baseline, making interpretation difficult (Marr, Mika, Miraglia, Roerig, & Sinnot, 2007).

While research examining the effectiveness of Sensory Stories supports the idea of embedding suggested sensory integrative-based strategies into stories, the Sensory Stories research (Marr, Mika, Miraglia, Roerig, & Sinnot, 2007) does not include all criteria identified as important by Gray (2004). Specifically, Gray emphasized the significance of creating a customized story to produce an individualized product that fits the learning characteristics of a specific child, including length, organization, sentence structure, and vocabulary. By using the Social Story format, an interventionist can also include individually tailored illustrations that will enhance the meaning of the text for the child (Gray, 2004). The Social Story criteria and guidelines offer a resource that can be followed by educators, therapists and caregivers to create highly individualized stories, written to the specific abilities, needs, and learning style of children with ASD.

The purpose of this study is to investigate the use of Social Stories as a tool to help preschool aged children with ASD utilize self-regulation strategies to promote increased functional behaviors.

Social Story Task Analysis

1- Checklist: The story meets the 10 criteria that define each Social Story:

_____ meaningfully shares social information in a patient and reassuring quality

_____ has an introduction that clearly identifies the topic, a body that adds detail, and a conclusion that reinforces and summarizes the information

_____ answers "wh" questions

_____ is written from a first or third person perspective

_____ uses positive language, omitting descriptions or references to negative behaviors in favor of identifying positive responses

_____ always contains descriptive sentences, with an option to include any one or more of the five remaining sentence types (perspective, cooperative, directive, affirmative, and/or control sentences)

_____ describes more than directs, follows the Social Story Formula

_____ has a format that is tailored to the abilities and interests of its intended audience, and is usually literally accurate

_____ includes individually tailored illustrations that enhance the meaning of the text

_____ has a title that meets all applicable Social Story criteria

2- Determine the number of each type of sentence in the story:

Sentences in a Social Story That Describe:

#_____ Descriptive Sentences, #_____ Perspective Sentences, # _____ Cooperative Sentences, #_____ Affirmative Sentence

Sentences in a Social Story That Direct:
#_____ Directive Sentences, # _____ Control Sentences

Figure 1. Social story task analysis

Sentence Definitions:
Descriptive Sentences: factual statements that are free of opinions and/or assumptions
Perspective Sentences: statements that refer to, or describe, a person's internal state, their knowledge/thoughts, feelings, opinions, motivation, physical condition/health.
Cooperative Sentences: identify what others will do to assist the child.
Directive Sentences: identify a suggested response or choice of response to a situation or concept, gently guiding the child's behavior.
Affirmative Sentences: enhancing the meaning of surrounding statements and often express a commonly shared value or opinion within a given culture.
Control Sentences: are statements written by the child to identify personal strategies for recalling and applying Social Story information.

3- The story follows the correct ratio of descriptive to directive sentences using the
Social Story Formula:

$$\frac{\text{Describe}}{\text{Direct}} \geq 2$$

*If there are no directive and/or control sentences, use 1 instead of 0 as the denominator

Note. Adapted from " Social Stories 10.0: The new defining criteria & guidelines," by C. Gray, 2004, *Jenison Autism Journal*, 15(4).

Figure 1. continued

CHAPTER 3

METHOD

Participants

Three children from a preschool program specifically designed for children who demonstrate characteristics of ASD participated in this investigation. The participants met the following inclusion criteria:

1. Difficulty with sensory modulation defined by scoring in the "Definite Difference" range on at least one subtest of the Sensory Profile School Companion completed by the child's preschool teacher (Dunn, 2006).
2. Free of visual or hearing impairments that were not already corrected with assistive devices such as glasses or hearing aides.
3. An interest in books as defined by a score of four or above on all questions on the teacher completed Preschool Book Interest 6-point Likert Scale (see Appendix A) (Kuoch & Mirenda, 2003).
4. Engaged in at least one behavior that interfered with daily educational activities, as determined by the classroom teacher.

Table 1 presents a summary for each participant, including age at the start of the study, results of any ASD assessments previously conducted with the participant, Sensory

Profile results, Preschool Book Interest Scale average scores, and behaviors that interfered with classroom participation.

Experimental Design

A multiple baseline across participants design was used to assess the effects of Social Stories as a tool to help preschool aged children with ASD utilize self-regulation strategies to increase functional behaviors. Prior to the introduction of the intervention, the researcher collected simultaneous baseline data across all participants. The researcher continued to collect data until the baseline for the first participant was stable and a trend was predictable. Next, the researcher initiated intervention for the first participant and continued until the data demonstrated a change in the desired behavior. Baseline data continued to be collected on the remaining participants. When a change in the desired behavior between the baseline and intervention for the first participant was documented, intervention for the second participant was introduced. This pattern continued through all participants. Baseline and intervention data were collected between 2-4 days each school week, dependent on the schedule of the participants and interventionist. Postintervention behavior was measured weekly to serve as a maintenance check to determine if experimental effects endured over time. Additionally, generalization of desired behaviors were measured during baseline, intervention, and maintenance phases to determine if experimental effects generalized to other activities.

Setting

This study was conducted in a self-contained preschool classroom in the Wasatch Front area of Utah. Students attended the preschool for 2 hours per day, 4 days a week. The preschool program was specifically structured for young children with ASD, with a ratio of no more than two children per adult. Four adults staffed the classroom, which included six preschool students, all of whom presented with behaviors characteristic of ASD. One adult had a bachelor's degree in early childhood special education, and the three other adults had high school diplomas. In addition to the above four adults, a speech-language pathologist and an occupational therapist served as classroom consultants.

All intervention sessions occurred during center-based activities, as the students rotated throughout the classroom to different learning stations. Intervention sessions occurred in a learning station, where the interventionist read the Social Story and then discussed and practiced the suggested strategies with the participants. The study took place over a 9-week period. As the students were on a year-round schedule, they were in school for 9 weeks and then out of school for 3 weeks. The study began as the students returned from a 3-week recess.

Materials

Materials for the study included a Social Story written specifically for each participant. Each story was developed using the guidelines "Social Stories 10.0" established by Gray (2004). The Social Stories included information regarding intervention strategies consistent with sensory integrative-based approaches (Ayres,

1979, Schaff et al., 2010). To ensure that the stories were written according to Gray's guidelines, three experts (one university faculty member in Special Education, one university faculty member in Occupational Therapy, and one school-based occupational therapist) examined and evaluated the stories using the criteria outlined in Figure 1. Each of the reviewers verified that all of the Social Stories met the criteria listed in the Figure 1 checklist.

In addition to the stories, objects that were needed to support the suggested interventions were available for the student and interventionist to use while practicing and implementing the self-regulation strategies. Objects included a weighted fabric tube or "lap buddy," a hand-held oval brush with double sided soft, dense plastic bristles, and a small squeezable ball. These objects were used to support self-regulation by calming and decreasing arousal levels through deep touch pressure and resistance to the joints of the students' bodies. In addition, a small toothbrush was used to support self-regulation by providing oral touch and pressure for one participant who demonstrated over-responsivity to oral textures (Schaff et al., 2010).

Interventionist

The author served as the interventionist for all participants. The interventionist had 8 years experience implementing sensory integrative-based activities in classroom settings and was a graduate student in special education. At the time of the study, the author served as the occupational therapist for the participants (as well as other children in the classroom), so the participants were familiar with her and she was frequently involved in on-going activities in the classroom.

Data Collection

Desired Behaviors

Participants' sensory processing abilities and their effect on the students' functional performance in the classroom and school environment were measured using The Sensory Profile School Companion, a standardized assessment tool that uses a Teacher Questionnaire consisting of 62 items (Dunn, 2006). The Teacher Questionnaire is made up of four Quadrant scores (Registration, Seeking, Sensitivity, and Avoiding), four School Factor scores (School Factors 1, 2, 3, & 4), and Section Scores for four sensory groups and one behavior group (Auditory, Visual, Movement, Touch and Behavior). These scores (a) reflect a student's responsiveness to sensory experiences, (b) indicate high and low sensory threshold responses, and (c) identify how the student's responsiveness to sensory experiences is reflected in his or her participation in the classroom (Dunn, 2006). Desired behaviors were selected based on the outcomes of the Sensory Profile School Companion, and behaviors identified by the classroom teacher that interfered with daily educational activities (see Appendix B).

Intervention Strategy

Data to assess the effectiveness of the intervention strategy were collected by the interventionist during baseline, intervention, and maintenance sessions. The interventionist observed each participant during a classroom activity in which the desired behavior should occur and used time sampling with coding sheets to collect data on the frequency of participants' engagement in current/undesired behaviors, desired behaviors, and the use or nonuse of self-regulation strategies (see Appendix C). Data were collected

at 30-second intervals during observation sessions ranging from 7-15-minute periods, depending on the length of the classroom activity.

Social Validity

Social validity includes collecting information about whether or not the intervention outcomes resulted in socially important products and whether or not they can be sustained within the typical resources of the intervention settings (McDonnell & Tuesday Healthfield, 2011). Data to assess the acceptability and perceived effectiveness of the intervention strategy by the early childhood special education teacher were collected using goal attainment scaling (GAS) and an anchored 7-point Likert scale survey developed by the researcher (see Appendices B and D). Progress made toward each participant's goal was documented, quantified and compared using GAS, which has been successfully applied to previous sensory integrative-based treatment studies (Schaff & Nightlinger, 2007). Through the use of interviews during goal-setting and posttreatment sessions, the GAS process captures functional and meaningful aspects of a person's progress that are challenging to assess using available standardized measures. It also provides a way to identify intervention outcomes that are specifically relevant to individuals and their families (Mailloux et al., 2007). The system for developing the goal attainment scales for this study followed the recommendations in the literature. However, as the study focused on one specific target behavior for each participant, only one goal was written rather than the recommended three (see Appendix E; Kiresuk, Smith, & Cardillo, 1994; Mailloux et al., 2007). The preschool teacher rated progress toward the identified goals following the final week of the study.

The Likert scale survey was designed to examine the teacher's perceptions regarding (a) the importance of the intervention strategy (i.e., teaching a child to recognize situations and use strategies to improve desired behaviors), and (b) the usefulness of Social Stories as an instructional tool for students. The preschool teacher completed the survey the following the final week of the study.

Procedures

Goal Individualization

Using data from the completed Sensory Profile School Companion assessments and information provided by the classroom teacher, the researcher individualized outcome measures for each child. One goal targeting behaviors that interfered with daily classroom activities was developed for each participant. The goal was used to define a desired behavior for each participant, as well as, provide a measurement guide for the goal attainment scaling (see Appendix B).

Baseline

Baseline observations occurred during a classroom activity that was identified by the classroom teacher as a time during which the child could engage in the desired behavior. Neither the Social Story nor the Social Story intervention was available during the baseline phase. The classroom teacher was asked to engage in routine classroom tasks and interactions during baseline.

Intervention

During the intervention phase of the study, participants were read the Social

Stories developed to address their identified classroom difficulties as well as the underlying sensory processing problems identified by the Sensory Profile School Companion (see Appendix F; Dunn, 2006). The interventionist read the Social Story to each student in a one on one learning opportunity. The interventionist and child discussed the story and the strategies presented in the story. They also practiced the strategies and talked about how the child could use the strategies in class.

In the context of Joshua's social story, he was introduced to self-regulation strategies that included proprioceptive activities such as giving himself a hug, pushing hands together firmly for 10 seconds, squeezing a ball in his hands and wearing a weighted fabric tube over his shoulders or lap. Joshua's story also included directions to take a deep breath, stay in his seat, listen to his teacher, and to wait for his turn.

Andre's Social Story addressed using a soft washcloth to provide pressure to his cheeks and lips, using a toothbrush to provide deep touch pressure to the inside of his mouth and tongue, giving himself a hug and pushing his hands together to provide deep pressure to his joints, and wearing a weighted fabric tube across his lap while eating his snack. Andre's story also included directions to (a) smell or touch his food before eating it, (b) try to take a bite of most of his food, and (c) to leave uneaten food on his plate.

Daniel's Social Story discussed strategies that included the use of a double sided oval brush with soft, dense bristles to provide deep touch pressure, giving himself a big hug, pushing his hand together firmly, and squeezing a ball in his hands to provide resistance and pressure to the joints of his body. Daniel's story also included directions to observe his friends and to attempt tactile play activities knowing that he could wash his hands when finished.

Following each one on one intervention session, the participant transitioned directly into the activity that was identified as difficult for the child. At this time, the interventionist observed the participant and recorded data about his behavior (see Appendix C).

Generalization and Maintenance

Generalization of desired behaviors was measured during baseline, intervention and maintenance phases. Generalization probes were conducted in the context of different classroom activities during which opportunities to engage in the desired behavior occurred. Maintenance data were collected one time per week during the postintervention phase until the onset of a 3-week school vacation. During this phase, reading, discussing and practicing the strategies found in the Social Stories was discontinued. However, materials used in the stories to help promote self-regulation were available for student use. Maintenance data were collected in the context of the same activity and with the same materials that were used during the intervention sessions.

Reliability

Interobserver agreement was obtained to evaluate both procedural fidelity and dependent variable reliability across all phases of the investigation.

To assess procedural fidelity, an independent observer (a university faculty member in a department of special education) recorded the interventionist's implementation of a task-analyzed list of procedures (see Appendix G). Procedural fidelity was collected for an average of 38% of the intervention sessions for all

participants, and was calculated by dividing the number of correct interventionist behaviors by the number of planned interventionist behaviors and multiplying the result by 100. Procedural fidelity for all 3 participants was 100% across all baseline and intervention phases.

To compute dependent variable reliability, the independent observer collected data on participant responses during an average of 33% of data collection sessions for all participants. That record of responses was compared to the interventionist's data as entered on a data sheet. To be considered an agreement, the observer and interventionist must have both coded the observed behavior as "current/disruptive behavior" or "desired behavior" and "use of self-regulation strategy" or "nonuse of a self-regulation strategy" (see Appendix C). To obtain a percentage of dependent variable reliability, the number of agreements was divided by the number of agreements plus disagreements and then multiplied by 100. Dependent variable reliability averaged 99% for all 3 participants across baseline and intervention phases of the study (range = 97-100%). During the maintenance phase of the study, dependent variable reliability averaged 100% for all 3 participants.

Table 1

Study Participant Profile

Participant Name	**Age at start of study**	**ASD Assessment**	**Sensory Profile-School Companion**	**Book Interest Average Score**	**Challenging Classroom Behavior**
Joshua	3 years, 7 months	ADOS-Autism Diagnostic Observation Scale: score=25; moderate to severe range for autism; Preschool program identified student as a child with characteristics of ASD	**Definite Difference Areas:** auditory, movement, touch, behavior, school factor 1, school factor 3, registration, seeking, and avoiding	5 scored 4 or above on all questions	Difficulty sitting and staying in seat, leaves chair during circle time, puts his legs over the side of chair; grabs objects such as song cards, books and props out of turn
Andre	5 years, 4 months	No formal assessment for ASD completed at time of study; Preschool program identified student as a child with characteristics of ASD	**Definite Difference Areas:** auditory, visual, movement, touch, behavior, registration, avoiding, school factor 1, school factor 3, school factor 4	5.5 scored 4 or above on all questions	Limited number of foods he is willing to eat; gets up from chair and throws away undesired food during snack time; limited communication skills to express preferences
Daniel	3 years, 2 months	No formal assessment for ASD completed at time of study; Preschool program identified student as a child with characteristics of ASD	**Definite Difference Areas:** touch, movement, registration, avoiding, school factor 3, and school factor 4	5 scored 4 or above on all questions	Avoids initiating or engaging in most types of play with other students. Avoids most types of sensory play that includes tactile sensory input, especially play in sand-type textures

CHAPTER 4

RESULTS

Overall, there was an increase in the frequency of desired behaviors across all participants. Results are depicted in Figure 2 and demonstrate a change in behavior from the baseline to the intervention phase of the study. Data also show that desired behaviors were maintained following the intervention phase. Specific results for each participant are reported below.

Joshua

Joshua's desired behavior was to stay seated in his chair during appropriate circle time activities for at least 10 minutes. During baselines 1 and 2, Joshua spent an average of 69% (range = 63-80%) of the intervals sitting appropriately at circle time and demonstrated 0% use of the identified self-regulation strategies (see Figure 2 and Table 2). In session one, Joshua demonstrated "desired behaviors" during 80% of the intervals. However, it was his first day back at school following a 3-week break and preschool staff appeared to demonstrate a high effort in verbally and physically assisting the participant to engage in "on-task" behaviors. This period of data collection is labeled as "Baseline 1" (see Figure 2 and Table 3). Following the first data probe in the baseline phase, the

support staff was asked to allow the student to engage in nonphysically supported or nonverbally prompted behaviors during circle time in order to establish an accurate baseline of Joshua's abilities to self-regulate and engage in desired behaviors. This data collection period is labeled as "Baseline 2." During baseline 2, Joshua demonstrated desired behaviors an average of 65.3% (range = 63-70%) of the intervals and 0% use of the identified self-regulation strategies (see Figure 2).

In the intervention phase, sitting appropriately in circle time increased to an average of 84.5% (range = 66-97%) and Joshua demonstrated the use of the identified self-regulation strategies for an average of 44.90% of intervals (see Figure 2 and Table 2). Although the Social Story intervention was discontinued at the maintenance phase, appropriate circle time sitting maintained an average of 98.6% (range = 96-100%). Additionally, utilization of self-regulation strategies was present during 59.40% of the maintenance intervals across five weekly data probes.

Generalization behaviors for Joshua were measured during intervention and maintenance phases of the study. The generalization probes were conducted in the context of snack time activities during which opportunities to engage in the desired behavior were present. Joshua exhibited generalization of the desired behavior an average of 98% of the intervals during two intervention phase observations, and during 100% of the intervals during two maintenance phase observations (see Figure 2). Additionally, he demonstrated generalization of the use of self-regulation strategies during 30% of the intervals during one maintenance phase generalization probe.

Andre

The desired behaviors identified for Andre were to stay seated for at least 10 minutes during snack time and to try at least two out of three offered food types or textures while allowing nonpreferred food to stay on his plate. During baselines 1 and 2, Andre participated in desired snack time behaviors for an average of 63.3% (range = 50-100%) of the observed intervals and demonstrated the use of the identified self-regulation strategies during 0.5% of the baseline intervals (see Figure 2 and Table 2). During the first two baseline sessions, the participant demonstrated desired behaviors 90% of the intervals. However, it was noted that the student received physical and verbal prompting from the preschool staff and was presented with only two types of highly preferred food. These first two data sessions are labeled as "Baseline 1" (see Figure 2). Following session two, the participant was offered at least three different food types and textures, and the support staff was asked to allow the student to demonstrate naturally occurring behaviors with verbal prompts from the lead teacher only. These data sessions are labeled as "Baseline 2." During baseline 2, Andre participated in desired snack time behaviors for an average of 57% (range = 20-87%) and 0% use of the identified self-regulation strategies (see Figure 2).

In the intervention phase, desired behaviors increased to an average of 95.4% (range = 86-100%) of the observed intervals and self-regulation strategies were utilized during 69.71 % of the observed sessions (see Figure 2 and Table 3). During the maintenance phase, the Social Story intervention was withdrawn and desired behaviors sustained during snack time for 98.8% (range = 95-100%) of the intervals, while self-regulation strategies were employed for 48.75% of the intervals.

Generalization behaviors for Andre were measured during baseline, intervention and maintenance phases of the study. The generalization probes were conducted during circle time activities in which opportunities to engage in desired behaviors were present. Andre exhibited generalization of desired behaviors an average of 68% of the intervals during one baseline observation, and for 96.5% of the intervals during two intervention phase observations. Additionally, he demonstrated generalization of the desired behaviors during 95% of the intervals during two maintenance phase observations (see Figure 2). Andre did not exhibit the use of self-regulation strategies during any of the generalization probes.

Daniel

The desired behavior identified for Daniel was to engage in tactile play with teachers and peers with no more than one verbal prompt from classroom staff in order to invite the student to participate. As evident in Figure 2, Daniel demonstrated high baseline variability in the percentage of intervals in which he would engage in tactile play activities (range = 0-84%) and demonstrated 0% use of the recommended self-regulation strategies. Although data obtained from the Sensory Profile School Companion assessment and teacher report indicated that the participant had difficulties with tactile play, specific types of aversions were not identified. Through initial baseline observations (Baseline 1), the interventionist noted that the participant specifically avoided playing with sand-type textures but tolerated play with other consistencies (e.g., finger paint and gelatin dessert). As a result, the interventionist refined the participant's goal to relate specifically to tactile play with sand-type textures and collected additional

baseline data (Baseline 2 in Figure 2). In baseline two, Daniel participated in tactile play with sand-type textures an average of 9.3% (range = 0-14%) of the observed intervals and used the recommended self-regulation strategies in 0% of the observed intervals (see Figure 2 and Table 2).

During the intervention phase, Daniel's tactile play participation increased to an average of 62.2% (range = 40-80%) while he demonstrated use of the self-regulation strategies for an interval average of 0.75% (see Figure 2 and Table 2). In the maintenance phase, the intervention was discontinued and Daniel demonstrated desired behaviors during tactile sand-type play activities an average of 83% (range = 80-86%) of the intervals. Daniel utilized the recommended self-regulation strategies during 0% of the maintenance intervals (see Figure 2 and Table 2).

Generalization behaviors for Daniel were measured during baseline and intervention phases of the study. The generalization probes were conducted in snack time activities during which opportunities to engage in the desired behaviors were present. Daniel demonstrated generalization of the desired behaviors throughout 100% of the intervals during three baseline and one intervention phase observation sessions (see Figure 2). He exhibited generalization of the use of self-regulation strategies during 10% of the intervals during one intervention phase generalization probe.

Social Validity

Survey

At the conclusion of the study, the classroom teacher completed a survey regarding the significance, effectiveness, and utility of the study (see Appendix D). The classroom teacher reported that she felt that the intervention strategy was moderately to

very appropriate as an instructional procedure and that it was moderately effective in teaching the participants the identified skills. With respect to helping the participants recognize sensory processing differences and related strategies through Social Stories, the teacher found the strategy to be moderately appropriate and reported that it was very important to provide specific guidance (e.g., verbal or physical prompts) in order to effectively teach the suggested strategies and target behaviors to the students. The classroom teacher indicated that implementing the intervention did not appear difficult, that it was well worth the time, and she would be very willing to implement the intervention in her classroom. She also reported that, while the suggested strategies sometimes made the students stand out from the rest of the class, the intervention was not disruptive to the classroom routines and activities.

Goal Attainment Scaling

In addition to completing a survey regarding the implementation and outcomes of the intervention, the classroom teacher evaluated each of the participants' goal accomplishments using goal attainment scaling (GAS). According to the teacher's assessment of the identified goals, Joshua achieved a +1 (better than expected), Andre achieved a 0 (expected level of performance), and Daniel achieved a -1 (less than expected level) (see Appendix B).

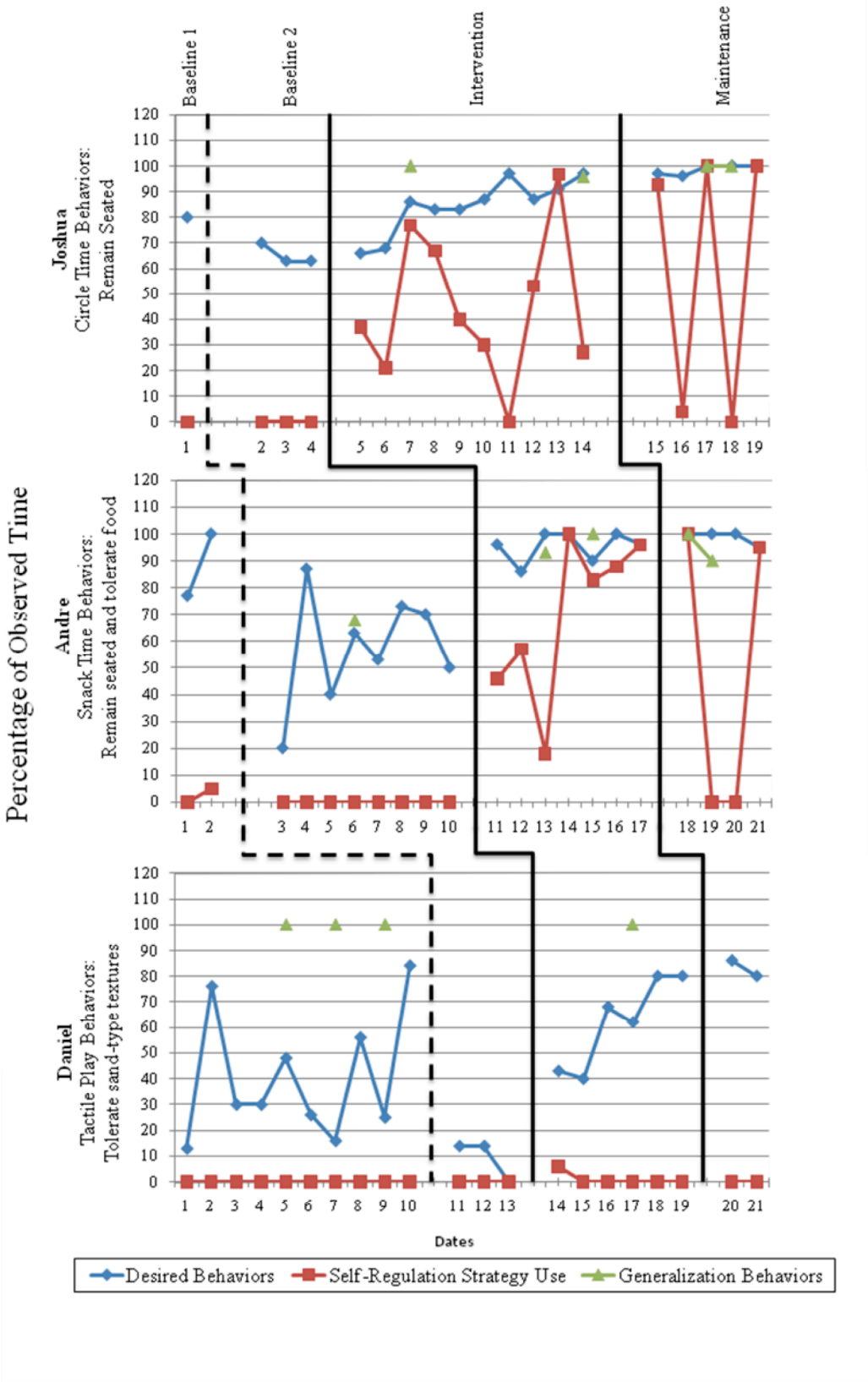

Figure 2. Graphed data results

Table 2

Average and Range of the Percentage of Intervals Participants Used the Identified Self-Regulation Strategies

Name	Baseline 1 & 2 Ave./Range	Intervention Ave./Range	Maintenance Ave./Range
Joshua	0 / 0-0	44.90 / 0-97	59.40 / 0-100
Andre	0.5 / 0-5	69.71 / 18-100	48.75 / 0-100
Daniel	0 / 0-0	0.75 / 0-6	0 / 0-0

Table 3

Average and Range of the Percentage of Intervals Participants Engaged in Current/Undesired Classroom Behaviors

Name	Baseline 1 Ave./Range	Baseline 2 Ave./Range	Intervention Ave./Range	Maintenance Ave./Range
Joshua	20 / 20-20	34.6 / 30-37	15.5 / 3-34	1.4 / 0-4
Andre	11.5 / 0-23	43 / 13-80	4.57 / 0-14	1.25 / 0-5
Daniel	59.5 / 16-87	89.6 / 86-100	37.8 / 20-57	17 / 14-20

CHAPTER 5

DISCUSSION

The purpose of this study was to examine (a) the effectiveness of an intervention strategy to help preschool aged children with characteristics of ASD utilize self-regulation strategies to promote increased functional behaviors and (b) how the classroom early childhood special educator perceived the significance, effectiveness and usefulness of the intervention.

Desired Behaviors

Using a multiple baseline across participants design, the researcher demonstrated measurable change across 3 different participants and behaviors. Results suggest that the intervention was successful in helping all 3 preschool aged children with characteristics ASD increase desired behaviors. This is noteworthy given the range of difficulties and classroom situations in which each participant was experiencing challenges (see Table 1). The research findings also add to the literature on the efficacy of Social Stories to promote positive behaviors in preschool aged children with ASD. Moreover, the results confirm research that acquired behaviors can be maintained over time (Crozier & Tincani, 2007; Kuoch & Mirenda, 2003).

Self-Regulation Behaviors

The use of self-regulation strategies varied for all 3 participants between the baseline, intervention and maintenance phases of the study. As reflected in Figure 2 and Table 2, the participants demonstrated little to no use of the identified self-regulation strategies during challenging classroom tasks prior to the intervention phase of the study. However, during the intervention and maintenance stages of the study two of the three participants (Joshua and Andre) demonstrated use of the self-regulation strategies. It is significant to note that as the participants were exposed to the self-regulation strategies in the context of their Social Story intervention and were given the objects to support self-regulation, the incidence of desired behaviors increased across intervention and maintenance phases of the study. These findings supplement existing research literature that supports the use of sensory integrative-based strategies to facilitate improved functional behaviors (e.g., Case-Smith & Bryan, 1999; Linderman & Stewart, 1999; Marr, Mika, Miraglia, Roerig, & Sinnot, 2007; Schaff & Nightlinger, 2007).

It is noteworthy to consider the differences observed in the frequency of self-regulation use among the participants. Specific strategies and objects to help promote self-regulation were reviewed with the participants during each intervention session, and items to help encourage self-regulation (e.g., weighted fabric tube, squeezable ball, double-sided oval bristle brush, toothbrush) were available to the students during all observations. It is difficult to determine whether or not the participants elected to use the objects only when they were aware that the items were available, or if the students used them "as needed" based on their internal state of self-regulation. For example, if the object used to promote self-regulation was in the participant's line of sight or within

reach, the student typically used the item during the observation period. However, if the item fell out of the line of sight or reach of the student, it was variable whether or not they used the item during the desired behavior observation. The variability seen in the participants' use of the self-regulation strategies may be related to response efficiency, which postulates that when an individual has the opportunity to choose between two or more possible responses, the response that the learner perceives as most efficient will be chosen (Johnston & Evans, 2005). In this situation, the participants may have determined that unless an object used to support self-regulation was readily available, it was more efficient not to seek out or utilize the object, but rather to participate in classroom activities without the suggested support.

The third research participant, Daniel, did not demonstrate utilization of self-regulation strategies during the baseline, intervention or maintenance phases of the study. It is not possible to determine the specific reason for why he did not utilize the self-regulation strategies during challenging classroom tasks; however, there are several conceivable explanations for his behaviors. First, the tangible objects (squeeze ball, brush with soft, dense bristles) given to Daniel to help promote self-regulation were difficult to utilize while engaging in his desired behavior (sand-type play). Second, Daniel may not have needed additional self-regulation strategies in order to increase his desired behavior. Finally, the strategies suggested and practiced within Daniel's Social Story intervention were preparatory in nature; therefore, it is possible that by participating in self-regulation strategies within the context of the Social Story intervention, Daniel did not need additional self-regulation supports during challenging classroom activities (see Table 1). Additional research related specifically to the

utilization of self-regulation strategies within the context of Social Stories is needed to further investigate this topic.

Generalization

Children who display characteristics of autism may learn slowly and frequently fail to generalize acquired skills. Therefore, it is important to obtain data related to the generalization of new skills (Noonan & Siegel, 2003). Generalization probes were conducted in the context of different classroom activities during which opportunities to engage in the desired behavior occurred. Andre's generalization behaviors follow the data trends seen in his desired behaviors throughout the baseline, intervention and maintenance phases of the study, with the incidence of desired behaviors increasing and maintaining following intervention. He did not demonstrate utilization of self-regulation strategies during generalization probes. Due to interventionist error, generalization data were not collected for Joshua during the baseline phase of the study. However, generalization of desired behaviors during intervention and maintenance, and generalization of self-regulation strategies during one maintenance phase probe was noted. Data for Daniel demonstrate generalization of desired behaviors and self-regulation strategies during the intervention phase. Due to interventionist error, generalization data were not collected during the maintenance phase of the study. In summary, results related to generalization of the desired behaviors and self-regulation strategies are inconclusive and prospective research should more fully investigate when and how desired behaviors and self-regulation strategies are generalized to multiple classroom situations.

Social Validity

The outcomes of the classroom teacher survey and goal attainment scaling (GAS) provide support for the future use of Social Stories with sensory integrative-based strategies. Although it is important to note that the teacher who completed the survey did not actually implement the intervention, teacher ratings were generally supportive of acceptability, ease of implementation, and future use of the strategy in her classroom.

Of further note, on the GAS, the teacher rated 2 of the 3 students as achieving an expected level or better than expected level of performance and 1 student as achieving a less than expected level of performance following intervention. It is unclear why the classroom teacher rated one of the participants' goals at the less than expected level, as the objective data demonstrate goal achievement at the expected level of performance for that participant (see Figure 2 and Appendix B). It seems plausible that the discrepancy between the teacher rated GAS and the actual data may have occurred because the teacher was not directly involved in the data collection and the observation of desired behaviors.

Limitations

Limitations associated with this study might affect the extent to which results generalize to other individuals, settings, or intervention targets. Study participants and the classroom programs they attend share a number of common characteristics. Consequently, the effectiveness of the intervention strategy might not be replicable with children or classroom settings that differ in substantive ways. Increased generalizability of findings could be obtained through replications that extend the use of the intervention

strategy to a broader range of children and classroom settings, and to early childhood teachers for use with children in their own classrooms.

Variability in the baseline data is noted as a limitation of this investigation. A record of baseline conditions serves as a pattern that allows the reader to predict how behavioral performance would continue if an intervention were not implemented (O'Neill, McDonnell, Billingsley, & Jenson, 2011). Therefore, it is important for the researcher to control for extraneous variables that could influence baseline data. Given the initial variability in baseline data for each participant, the researcher intervened in order to control for external influences. This resulted in two baseline phases for each participant (Baseline 1 and Baseline 2). There are several plausible explanations for the baseline variability. First, during the initial week of data collection, participants had just returned to school from a 3-week break. This dramatic change in the daily routine for the participants could have affected the stability of classroom behaviors. Future studies should initiate baseline following a 2-3-week introduction (or reintroduction) to the classroom setting to help ensure that data collected accurately portray "typical" classroom behaviors. Second, changes within target activities (e.g., snack foods, manipulatives) may have resulted in variability in baseline performance. For example, Daniel demonstrated difficulty participating in tactile play activities with sand-type textures, but engaged in tactile play with other textures (e.g., finger paints, shaving cream). As a result, Daniel's baseline data varied according to the materials presented during the classroom activity. In the future, a functional assessment conducted prior to baseline may help the researcher to more accurately identify variables that influence behaviors. Specifically, a functional assessment could help describe the problem

behavior, identify the events, time and circumstances that are regularly associated with the occurrence and the nonoccurrence of the problem behavior, and identify the consequences that maintain the behavior (O'Neill et al., 1997).

Finally, it is important to note that the classroom teacher completed the Sensory Profile School Companion and helped the interventionist link identified sensory deficits with challenging classroom behaviors for each participant just prior to baseline observations. Participation in these activities may have heightened the teacher's awareness of her students' needs resulting in increased support and modifications to classroom activities during baseline. This is supported in that trends in behaviors during baseline stabilized upon a return to typical classroom routines and staff interactions. In future studies, the interventionist could brief the staff prior to the baseline phase of the study on the importance of measuring typical participant behavior prior to intervention.

Implications for Further Research

It is important to note that the independent variable, the Social Stories, used in this study had two foci. Specifically, each Social Story was designed to (a) encourage desired behaviors, and (b) teach the use sensory integrative-based strategies to promote self-regulation. Given the design of this study, it is not possible to determine how these two components individually influenced the outcomes. Future studies focusing on each component would be helpful. Specifically, using a single case research alternating treatment design, a researcher could compare the effects Social Stories written to encourage desired behaviors with Social Stories written to teach self-regulation strategies (McDonnell, Jameson, & Rose, 2011).

It is significant to note that the researcher was the interventionist in this study and was not a daily member of the teaching staff; therefore, it is important to determine if teachers, parents, staff, and other caregivers can implement this intervention effectively and efficiently. Future studies could utilize evidence-based research related to Social Stories and sensory integrative-based treatments while employing the Replicating Effective Programs (REP) framework (Kilbourne, Neumann, Pincus, Bauer, & Stall, 2007). REP attempts to bridge the research-to-practice gap and provides a roadmap for implementing evidence-based interventions into community-based settings through a combination of "intervention packaging," training, technical assistance, and other strategies that help maximize the chances for sustaining interventions (Kilbourne, Neumann, Pincus, Bauer, & Stall, 2007).

Replication of single case research designs is central to recent efforts to ensure that these approaches are given due consideration in federal efforts to identify evidence-based practices in education and special education (O'Neill, McDonnell, Billingsley, & Jenson, 2011). In order to support the effectiveness and potential implementation of Social Stories with sensory integrative-based strategies in community and education settings, future studies utilizing a direct type of replication, which involves the same types of participants, settings, and procedures as in the original experiment, should be conducted (O'Neill, McDonnell, Billingsley, & Jenson, 2011).

Implications for Practice

The intervention techniques used in this study focused on teaching desired behaviors and self-regulation strategies through Social Stories. For example, through a

Social Story, Joshua was taught appropriate circle time behaviors as well as activities to encourage self-regulation. Following intervention, he demonstrated an increase in desired behaviors (sitting in his chair during circle time) and use of self-regulation strategies (using a weighted tube across his lap or shoulders during circle time). As a result, Joshua was able to participate in circle time activities with little to no assistance from classroom support staff. Practitioners may consider the use of Social Stories as a tool to increase independence and encourage self-regulated behaviors.

The external validity of this research study is supported by the social validity data. In consequence, several strengths regarding the use of Social Stories with sensory integrative-based instruction may be applied to current educational settings. Specifically, the classroom teacher indicated that implementing the intervention did not appear difficult, that it was well worth the time, and that she would be very willing to implement the intervention in her classroom. In relation to the response-efficiency theory, educators may be more willing to utilize and incorporate intervention methods within their own classroom environments if the outcomes are perceived as worth their time and effort (Johnston & Evans, 2005).

The results of this study support the existing research literature base that encourages the use of Social Stories, sensory integrative-based intervention strategies and the use of embedding sensory integrative-based approaches in a story format to help increase functional skills in children with ASD (Case-Smith & Bryan, 1999; Crozier & Tincani, 2007; Kuoch & Mirenda, 2003; Linderman & Stewart, 1999; Marr, Mika, Miraglia, Roerig, & Sinnot, 2007; Schaff & Nightlinger, 2007). School administrators

and educators may be more supportive and apt to implement an intervention if it is backed with research literature (O'Neill, McDonnell, Billingsley, & Jenson, 2011).

Finally, this study provides data supporting the individualization of sensory integrative-based Social Stories. Through individualization, personal preferences, interests, learning styles, and sensory processing abilities can be specialized to a specific student and setting (Gray, 2004). This is in contrast to commercially available stories that are offered in a pre-written and illustrated format.

As demonstrated in this investigation, through both empirical and socially validated evidence, Social Stories offering sensory integrative-based strategies may provide an effective and socially valid way for educators to address students' sensory processing challenges and behavioral difficulties in a naturalistic classroom setting.

APPENDIX A

PRESCHOOL BOOK INTEREST SCALE

1. The child usually looks at books right side up.

Always	Very Frequently	Occasionally	Rarely	Very Rarely	Never
6	5	4	3	2	1

2. The child turns pages, starting from the beginning of the book to the end.

Always	Very Frequently	Occasionally	Rarely	Very Rarely	Never
6	5	4	3	2	1

3. The child enjoys looking at pictures in books.

Always	Very Frequently	Occasionally	Rarely	Very Rarely	Never
6	5	4	3	2	1

4. The child can pay attention to a story for 3-5 minutes with an adult.

Always	Very Frequently	Occasionally	Rarely	Very Rarely	Never
6	5	4	3	2	1

APPENDIX B

GOAL ATTAINMENT SCALING

Child: Joshua

Concern: Scored "Definite Difference" on Sensory Profile School Companion Areas: auditory, movement, touch, behavior, school factor 1, school factor 3, registration, seeking, and avoiding.

Circle Time: Difficulty sitting and staying in seat, leaves chair during circle time, puts his legs over the side of chair; grabs objects such as song cards, books and props out of turn.

Goal: Joshua will stay seated in his chair during appropriate times during at least 10 minutes of circle time activities.

Intervention Period: 10 Sessions

-2	-1	0	+1	+2
Much less than expected level	Less than expected level	Expected level of performance	Better than expected level	Much better than expected level

-2	-1	0	**+1**	+2
Joshua will stay seated in his chair during appropriate times during at least 5 minutes of circle time activities	Joshua will stay seated in his chair during appropriate times during at least 8 minutes of circle time activities	Joshua will stay seated in his chair during appropriate times during at least 10 minutes of circle time activities	Joshua will stay seated in his chair during appropriate times during at least 12 minutes of circle time activities	Joshua will stay seated in his chair during appropriate times during at least 15 minutes of circle time activities

Child: Andre

Concern: Scored "Definite Difference" on Sensory Profile School Companion Areas: auditory, visual movement, touch, behavior, registration, avoiding, school factor 1, school factor 3, school factor 4.

Snack Time: Limited number of foods he is willing to eat; gets up from chair and throws away undesirable food during snack time, limited communication skills to express preferences.

Goal: Andre will stay seated for at least 10 minutes during snack time and try at least 2/3 different food types/textures offered during snack time, while allowing non-preferred food to stay on his plate.

Intervention Period: 7 sessions

-2	-1	0	+1	+2
Much less than expected level	Less than expected level	Expected level of performance	Better than expected level	Much better than expected level

-2	-1	**0**	+1	+2
Andre will stay seated for at least 5 minutes during snack time and eat at least 1/3 different food types /textures offered during snack time, getting up to throw away food not more than two times	Andre will stay seated for at least 7 minutes during snack time and eat at least 1/3 different food types/textures offered during snack time, getting up to throw away food no more than one time	Andre will stay seated for at least 10 minutes during snack time and try at least 2/3 different food types/textures offered during snack time, while allowing non-preferred food to stay on his plate	Andre will stay seated for at least 13 minutes during snack time and eat at least 3/3 different food types/textures offered during snack time, while allowing non-preferred food to stay on his plate	Andre will stay seated for at least 15 minutes during snack time and eat at least 3/3 different food types/textures offered during snack time, while allowing non-preferred food to stay on his plate

Child: Daniel

Concern: Scored "Definite Difference" on Sensory Profile School Companion Areas: touch, movement, registration, avoiding, school factor 3, and school factor 4.

Tactile Play: Avoids initiating or engaging in most types of play with other students. Avoids most types of sensory play that includes tactile sensory input, especially play in sand-type textures.

Goal: Daniel will engage in tactile play (i.e., sand-type textures) with teacher and peers with no more than one verbal prompt from classroom staff in order to invite the student to participate.

Intervention Period: 6 Sessions

-2	-1	0	+1	+2
Much less than expected level	Less than expected level	Expected level of performance	Better than expected level	Much better than expected level

-2 **-1** 0 +1 +2

Daniel will engage in tactile play (ie sand-type textures) with teachers and peers with no more than three verbal prompts from classroom staff	Daniel will engage in tactile play (ie sand-type textures) with teachers and peers with no more than two verbal prompts from classroom staff	Daniel will engage in tactile play (ie sand-type textures) with teacher and peers with no more than one verbal prompt from classroom staff in order to invite the student to participate	Daniel will engage in tactile play (ie sand-type textures) with teachers and peers with no verbal prompts from classroom staff	Daniel will initiate tactile play (ie sand-type textures) with teachers and peers with no verbal prompts from classroom staff

APPENDIX C

STUDENT DATA SHEET

Student:_____

Current/Undesired Behavior: (description of current behavior prior to change)

Desired Behavior: (description of desired behavior after change)

Social Story-Self Regulation Strategy: (description of strategy given to participant in their specific Social Story; implemented only by interventionist only during reading of Social Story)

Observation Setting(s): (description of setting in which target behavior should occur)

Data check sheets to record daily observations

Student:_____

Date:_____

Intervention Start Time:_____ Intervention End Time:_____

Observation Start Time:_____ Observation End Time:_____

Instructions: Using time sampling, mark the observed behavior every 30 seconds during a 15-minute observation period as indicated by a preset timer.

30 Second Intervals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Current/ Undesired Behavior															
Desired Behavior															
Use of Self Regulation Strategy															
No use of self regulation strategy															

APPENDIX D

SURVEY

Social Stories as a tool to help preschool aged children with autism implement self-regulation strategies

Please complete this checklist following your observation of an intervention session with the participant. All questions, unless otherwise indicated, refer to the target child and his/her identified goal. Information gained from this questionnaire will be used to help revise the teaching procedures for use within developmentally appropriate programs in ways that benefit all children, families, and educators. Your ideas are important. Thanks for taking the time to share them with us.

1) Do you think that the **intervention strategy** was an appropriate instructional procedure for teaching the child the identified skill?

Not Appropriate		Moderately Appropriate			Very Appropriate	
1	2	3	4	5	6	7

2) Was the **intervention strategy** effective in teaching the child the identified skill?

Not Effective		Moderately Effective			Very Effective	
1	2	3	4	5	6	7

3) How difficult did it appear to be to implement the **intervention strategy** in the classroom setting?

Not Difficult		Moderately Difficult			Very Difficult	
1	2	3	4	5	6	7

4) Do you feel that it was important to help the student **recognize sensory processing differences and related strategies through Social Stories** in order to effectively teach the identified skill to the child?

Not Important		Moderately Important			Very Important	
1	2	3	4	5	6	7

5) Did it appear difficult to help the student **recognize sensory processing differences and related strategies through Social Stories** within the context of regular preschool activities?

Not Difficult		Moderately Difficult			Very Difficulty	
1	2	3	4	5	6	7

6) Do you feel that helping the student **recognize sensory processing differences and related strategies through Social Stories** was an appropriate instructional procedure for teaching the identified skill to the child?

Not Appropriate		Moderately Appropriate			Very Appropriate	
1	2	3	4	5	6	7

7) Do you feel that it was important to **discuss and practice** the suggested strategies in order to effectively teach the identified skill to the child?

Not Important		Moderately Important			Very Important	
1	2	3	4	5	6	7

8) Did it appear difficult to **discuss and practice** the suggested strategies within the context of regular preschool activities?

Not Difficult		Moderately Difficult			Very Difficult	
1	2	3	4	5	6	7

9) Do you feel that **discussing and practicing** the suggested strategies was an appropriate instructional procedure for teaching the identified target behavior to the child?

Not Appropriate		Moderately Appropriate			Very Appropriate	
1	2	3	4	5	6	7

10) Do you feel that it was important to **provide specific guidance** (e.g., verbal or physical prompts) in order to effectively teach the suggested strategies and target behavior to the child?

Not Important		Moderately Important			Very Important	
1	2	3	4	5	6	7

11) Did it appear difficult to **provide specific guidance** (e.g., verbal or physical prompts) within the context of regular preschool activities?

Not Difficult		Moderately Difficult			Very Difficult	
1	2	3	4	5	6	7

12) Do you feel that **providing specific guidance** (e.g., verbal or physical prompts) was an appropriate instructional procedure for teaching the identified skill to the child?

Not Appropriate		Moderately Appropriate			Very Appropriate	
1	2	3	4	5	6	7

13) Did the intervention and suggested strategies appear to be **disruptive** to the classroom routines and activities?

Not Disruptive		Moderately Disruptive			Very Disruptive	
1	2	3	4	5	6	7

14) Did the intervention and suggested strategies make the child **stand out** in any way from the rest of the class?

Stood Out			Sometimes			Did not Stand
A Great Deal			Stood Out			Out at All
1	2	3	4	5	6	7

15) Did you observe the child verbally or nonverbally **express dislike** of the intervention and strategies?

Strongly			Expressed			Expressed
Expressed Dislike			Some Dislike			No Dislike
1	2	3	4	5	6	7

16) Did the child seem to **enjoy** the intervention strategy?

Did Not			Enjoyed			Seemed
Seem to Enjoy			Some of the Time			To Enjoy
1	2	3	4	5	6	7

17) Has the child displayed any **new inappropriate behaviors**, which may be associated with the use of the intervention strategy and were not observed prior to the use of the procedures?

Displayed Frequently			Displayed Some of the Time			Did Not Display
1	2	3	4	5	6	7

18) Do you feel that the **time required** to implement the intervention and strategies in the preschool was worth the observed benefits to the child?

Too Much Time			Somewhat Worth The Time			Well Worth The Time
1	2	3	4	5	6	7

19) If given training and support would you **feel confident** implementing the intervention strategy yourself?

Not at All Confident			Moderately Confident			Very Confident
1	2	3	4	5	6	7

20) If given training and support would you **be willing** to implement the strategy in your classroom?

Not at all Willing		Moderately Willing			Very Willing	
1	2	3	4	5	6	7

21) Is it likely that the target child will **continue to demonstrate** the identified target behavior in the classroom after completion of the study?

Yes	No
1	2

22) It would be difficult to use this strategy and still meet the needs of the other children in the classroom.

Yes No

23) Has the intervention strategy had any noticeable effect **on the other children** in the classroom? If so, what effects did you observe?

24) What **changes would you recommend** to improve the implementation or the design of the intervention strategy?

Comments:

APPENDIX E

GUIDE TO DEVELOPING AND SCALING GOALS

1-Identify the issues that will be the focus of treatment.

2-Translate the selected problems into at least three goals.

3-Choose a brief title for each goal.

4-Select an indicator for each goal.

5-Specify the expected level of outcome for the goal.

6-Review the expected level of outcome.

7-Specify the somewhat more and somewhat less than expected levels of outcome for the goal.

8-Specify the much more and much less than expected levels of outcome.

9-Repeat these scaling steps for each of the three or more goals.

APPENDIX F

SOCIAL STORIES

Joshua is Ready for Circle Time!
My name is Joshua. Everyday our class sits in chairs for circle time. We sit in our chairs to sing songs and to listen to stories. My teacher is trying hard to teach me and my friends are trying hard to listen. Sometimes I may want to get up to pick a song or book. I need to stay in my chair and wait for my teacher to say it is okay. My teachers can help me learn special things to get ready to sit in my chair at circle time.
I can do special things to help my body get ready so I can stay in my chair! Before circle time, my teacher will show me how to give myself a big hug, put my hands together and push hard while I count to ten, and squeeze my ball five times. When I go to circle time, I can bring a lap buddy to put on my legs or shoulders and a special squeeze toy.

In circle time, if I want to get out of my chair when it's not my turn, I will try hard to take a deep breath, give myself a hug, or squeeze my toy.

After circle time is over, I will be ready for snack! Sitting in circle time with my class is a great way to learn!

Andre is Ready for Snack!
My name is Andre. Everyday our class sits in chairs at the table for snack time. We have snack so that we don't get hungry. Snacks can make our body happy and healthy. Food can be sweet or salty. Food can be smooth, wet or crunchy. Food can be lots of different colors.
At snack time we have different foods everyday. Sometimes food fees, tastes or smell different in our bodies. My teacher can help me learn special things to get my body ready for snack time.

She can show me how to give myself a big hug and push my hands together and squeeze hard for ten seconds. We can use a toothbrush and move it all around inside my mouth, cheeks and lips. We can use a soft washcloth to rub my cheeks and lips. These special things can help me get ready for snack.

During snack, I can smell and touch my food before eating it. I will try to take a bite of most of my food. It is okay to leave food on my plate, even if I don't eat it.

In snack time, if my body doesn't feel right I will try to take a deep breath, put the lap buddy over my legs, or give myself a hug. When I need to tell my teacher something, I can use my word board.

Sitting at the snack table and eating different foods can be fun!

It is Fun to Play Using our Hands!

My name is Daniel. In school there are lots of things to play and learn everyday. At school sometimes the things that we play with can be wet, smooth, bumpy, cold, or warm- like sand, water, or bubbles.

Sometimes when I play, things can feel funny to my skin. My teacher can help me learn special ways to get ready for touching things when I play. She can rub a small brush or washcloth on my hands and arms. She can show me how to give myself a big hug, put my hands together and push hard for ten seconds, and how to squeeze a ball in my hands five times.

When I go to play with something that is wet, sandy or gooey sometimes my hands can feel funny or messy. This is okay, because I can always wash my hands when I am done playing.

Before I play, I can watch my friends and teachers and see that they are okay! I can play with toys and get them messy and then I will try to put my hands in.

During play, if my body doesn't fee right, I can take a deep breath and try to keep playing. My teacher can help me wipe or wash my hands when I am done playing.

Playing in sand, water, and paint with my friends can be fun!

APPENDIX G

SOCIAL STORIES PROCEDURAL RELIABILITY

Child:_____Date:_____Observer:_____

Procedure	**Observed**	**Not Observed**	**Comments**
Intervention objects in learning center			
Participant positioned in learning center			
Social Story in reach of Part./Intervent.			
Intervent. says, "time to read story"			

Procedure	**Observed**	**Not Observed**	**Comments**
Intervent. reads Social Story to Part.			
Intervent. responds to Part. questions (see table-expected responses)			
Intervent. responds to Part. comments (see table-expected responses)			
Intervent. discusses strategies (see table-possible strategies)			
Intervent. demonstrates strategies (see table-possible strategies)			
Intervent. & Part. practice strategies (see table- modeling and cueing strategies			

Intervent. responds to Part. questions (see table-expected responses)			

Procedure	**Observed**	**Not Observed**	**Comments**
Part. prompted to return to class activ.			
Intervent. collects data sheets			
Intervent. observes Part. behavior			
Intervent. records occur. of target behav.			
Intervent. records occur. of self reg. strat.			

Procedural Fidelity Table

Possible Participant Questions or Comments:

- 1-3 utterances regarding story or strategy

Possible Interventionist Responses:

- 1-3 utterances in response to story or strategy

Interventionist Discusses Social Story:

- 1-3 utterances reinforcing situation and strategy given in Social Story

Interventionist Demonstrates Social Story:

- Provides participant demonstration of strategies while verbally reinforcing the desired situation to implement strategies

ie: giving self a big hug, using a fidget toy to be used during circle, putting on a weighted vest to be worn during play time, getting mouth ready for snack time using a nuk or tooth brush, etc.

Interventionist and Participant Practice Strategies:

- Interventionist asks participant to practice strategies, saying "Let's practice"
- Steps Include:

1- Interventionist provides verbal cueing to initiate social story strategy practice, if participant does not respond- go to step 2
2- Interventionist provides verbal cueing and modeling to initiate social story strategy practice, if participant does not respond- go to step 3
3- Interventionist provides verbal cueing and full physical prompts to initiate practice social story strategy

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